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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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MYERS BIGEL SIBLEY & SAJOVEC PO BOX 37428 RALEIGH, NC 27627			DHINGRA, RAKESH KUMAR	
			ART UNIT	PAPER NUMBER
			1763	
DATE MAILED: 03/24/2006				

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	<b>Application No.</b> 10/714,214	<b>Applicant(s)</b> SUMAKERIS ET AL.	
	<b>Examiner</b> Rakesh K. Dhingra	<b>Art Unit</b> 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 January 2006.
- 2a) ☒ This action is **FINAL**.      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☒ Claim(s) 1 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 November 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Drawings***

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

Figure 2 – reference number 156 is not shown in drawing as mentioned on page 5, line 16 of specification;

Figure 2 – reference number 112 is not shown in drawing as mentioned on page 5, line 17 of specification;

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The disclosure is objected to because of the following informalities:

Page 7, line 13 reads "an end slot 152B" whereas Figure 10 shows slot reference number as "152C".

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Page 9, line 10 reads "tab 110A" whereas Figure 5 shows tab reference number as "110B".

Appropriate correction is required.

### **Claim Objections**

Claim 1 is objected to because of the following informalities:

Line 6 of the claim recites "formed form the susceptor" which should read "formed from the susceptor".

Appropriate correction is required.

### **Response to Arguments**

#### Regarding Claims 1, 2

Applicant's arguments filed 01/17/06 have been fully considered but they are not persuasive as explained below:

In Claim 1 - Applicant has argued that reference by Kordina et al does not teach claim limitation "without requiring disassembly of susceptor".

Examiner responds that Kordina et al teaches use of screws 15 to secure liner plate 16, 17 with susceptor plates 11-14 as against pin 139 and holes 130A (in liner 160) and 160A 9in (liner 160), or tab 110B (in bottom susceptor 110) and recess 152B (in liner 150 {for eample} used by the applicant to secure liner to susceptor. Both apparatus (Kordina et al as well as applicant) would thus need disassembly of susceptor.

Accordingly Claim 1 and its dependent claim 2 have rejected under 35 USC 102 (b) as explained below.

#### Regarding Claims 3, 8-10

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Applicant has amended claim 3 by changing limitation in lines 11, 12.

Applicant argues that Kordina et al do not suggest a platter and further there is no suggestion to modify Kordina et al to make hole in the liner.

Examiner argues that Kordina et al does teach a plate (platter) 5 (Figure 2) of prior art which forms the basis for the improvement in his invention. Further Kuramata teaches a liner 12 with opening (Figure 5) and Mezey teaches a recess 134 (opening) which when combined with Kordina et al reads on the claim limitation. Accordingly claim 3 and new dependent claims 8-10 have been rejected under 35 USC 103 (a) as explained below.

Regarding Claim 4, 11

Applicant's arguments filed 01/17/06 have been fully considered but they are not persuasive as explained below.

Applicant argues that previous office action acknowledges that Mezey does not disclose a liner having a variable thickness and there is no motivation to combine teaching of Kuramata with those of Mezey.

Examiner responds that Mezey teaches adjustment of slope of variable gradient plate (liner) in the chamber (which implies variable thickness of liner in a broad sense) by means of connectors 154 so that depletion of process gases can be compensated and uniformity of deposition can be improved (Menzey - Column 11, line 45 to Column 12, line 15). Kuramata teaches use of variable thickness of liner (an alternate method for adjustment of slope of liner). Thus there is motivation to use variable thickness of liner as taught by Kuramata instead of changing slope of velocity gradient plate in the apparatus of Menzey. Accordingly claim 4 has been rejected under 35 USC 103 (a)

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being unpatentable over Kordina et al in view of Mezey and Kuramata as explained below.

Claim 11 (new dependent claim) has also been rejected under 35 USC 103 (a) as explained below.

Regarding Claims 5-7, 12

Applicant's arguments with respect to claims 5-7 have been considered but are moot in view of the new ground(s) of rejection since claim 5 has been amended. Accordingly claim 5 and dependent claims 6,7 and new dependent claim 12 have been rejected under 35 USC 103 (a) as explained below.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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**Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kordina et al (EP 0956376 which is equivalent to US Patent No. 5,695,567, Kordina et al).**

Regarding Claim 1: Kordina et al teach a housing assembly (Figure 5) for an heating means (induction heating device) 18, the housing assembly defining a processing chamber and comprising:

a susceptor (comprising of two lateral wall pieces 11 and 12, a top wall piece 13 and a bottom wall piece 14) surrounding at least a portion of the processing chamber; and  
a thermally conductive liner (comprising of first plate 16 and second plate 17 made of SiC) interposed between the susceptor and the processing chamber wherein the liner is separately formed from the susceptor (Column 5, lines 45-67). Kordina et al also teach that it is easy to assemble the susceptor plates 11-14 and to secure these with liner plates 16, 17 using screws 15 which is equivalent to other securing means like using pins and holes or tab with recess.

Therefore it would have been obvious to use susceptor and liner configuration as taught by Kordina et al to avoid non-uniform etching on susceptor parts.

In this connection courts have ruled (Case law):

"Making elements separable was held to have been obvious. *In re Dulberg* 129 USPQ 148 (CCPA 1961).

Regarding Claim 2: Kordina et al discloses (Figure 5) that housing assembly includes:  
a first susceptor portion 11 or 13 and a second susceptor portion 12 or 14 disposed on opposed sides of the processing chamber;

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a first plate (liner) 16 disposed between the first susceptor portion and the processing chamber; and

a second plate (liner) 17 disposed between the second susceptor portion and the processing chamber.

**Claims 3, 4, 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kordina et al (EP 0956376 which is equivalent to US Patent No. 5,695,567, Kordina et al) in view of Kuramata (JP 401027225A). and Mezey (US 6,331,212).**

Regarding Claim 3: Kordina et al teaches a housing assembly (Figures 2, 5) for an induction heating device, the housing assembly defining a processing chamber and comprising:

a susceptor 6 surrounding at least a portion of the processing chamber (Fig. 2); and  
a thermally conductive liner (plates 16, 17 – Figure 5) interposed between the susceptor and the processing chamber (Fig. 5 Item 16 and 17), wherein the liner is separately formed from the susceptor;

wherein the susceptor includes a platter region {area/region where plate 5 (platter) is located, Fig. 2}, the housing assembly further including:

plate (platter) 5 adapted to support the substrate (article) 2 disposed in the processing chamber and overlying the platter region.

Kordina does not expressly teach an opening defined in the liner and overlaying the platter region.

Kuramata teaches (Figures 3, 5, 6) a substrate heating apparatus that includes a substrate holder (platter) 4 with a substrate 3 and a liner 12 with an opening (not shown



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in drawing) for gases to reach substrate 3 after flowing over the liner 12 (as shown in Figure 5) thus exposing the platter region (of platter) through opening in the liner [Formal translation of the reference has been requested].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the liner of Kordina et al so as to have an opening as taught by Kuramata to enable process gases flow to the substrate for processing.

Further Mezey discloses an opening 134 (Figure 4) defined in the susceptor interposed between the platter region (region including recess 134) and the platter 122. Kordina and Mezey are analogous art because they are from the same field of endeavor, namely hot-walled inductive heating chemical vapor deposition assemblies.

Therefore it would have been obvious to a person of ordinary skill in the art at the time of invention to form Kordina et al's assembly with an opening defined in the liner interposed between the platter region and the platter as taught by Kuramata and Mezey such that platter is arranged to fit into a recessed area and that the top of the wafer can be held substantially planar with the areas of the bottom surface of the process zone that surround recessed area (Mezey, Column 11 Lines 36-40).

Regarding Claim 4: Mezey teaches a susceptor 134 surrounding at least a portion of the processing chamber (Fig. 4 Item 134); and a velocity gradient plate (thermally conductive liner) 150 interposed between the susceptor and the processing chamber, wherein the liner is separately formed from the susceptor. Mezey further teaches that plate 150 can be moved by changing length of connectors 154 with which the velocity gradient plate 150 is suspended, so as to adjust distance between velocity gradient

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plate 150 and wafer support 122 (that is slope of liner 150 is adjusted- like varying thickness of liner) so that by adjustment of slope of velocity gradient plate (liner) 150 depletion of process gases can be compensated and uniformity of deposition can be improved (Mezey – Column 11, line 45 to Column 12, line 15).

Further, Kuramata discloses a housing assembly (Figure 5) for an induction heating device with a liner 12 that varies in thickness along at least a portion of its length (Page 2, Lower Right Column, Lines 1-7). Mezey and Kuramata are analogous art because they are form the same field of endeavor, namely induction heating chemical deposition assemblies.

Regarding Claim 8: Kordina et al in view of Kuramata and Mezey teach that platter region in susceptor plate 14 (Kordina et al, Figure 5) is exposed through opening in liner 16.

Regarding Claim 9: Mezey teaches (Figure 4) that platter 122 is received in recess 134.

Regarding Claim 10: Mezey teaches wafer support (platter) 122 allows rotation of wafer through stem 130 and disk 126 (Column 8, lines 12-25).

Regarding Claim 11: Kuramata teaches that liner 22 contacts susceptor 24 (Figure 2 and abstract).

**Claims 5-7, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kordina et al (EP 0956376 which is equivalent to US Patent No. 5,695,567, Kordina et al) in view of Hölzlein (US 6,406,983).**

Regarding Claims 5-7: Kordina et al teach housing assembly (Figure 5) for an induction heating device, the housing assembly defining a processing chamber and comprising:

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- a) a susceptor (comprising of two lateral wall pieces 11 and 12, a top wall piece 13 and a bottom wall piece 14) surrounding at least a portion of the processing chamber; and
- b) a thermally conductive liner (comprising of first plate 16 and second plate 17 made of SiC) interposed between the susceptor and the processing chamber, wherein the liner is separately formed from the susceptor;
- c) wherein the susceptor 11-14 includes a susceptor material (core) of graphite (first material) and a susceptor coating of SiC (second material); and
- d) wherein the liner 16, 17 is interposed between the susceptor coating and the processing chamber (Column 5, lines 45-67).

Kordina et al do not teach second material (for coating on susceptor) is selected from the group consisting of refractory metal carbides.

Hölzlein et al teach a housing assembly (Figures 1, 2) for an induction heating device, the housing assembly defining a processing chamber and comprises a susceptor 13 and a base plate (thermally conductive liner) 17 and where the susceptor has a coating 20 of TaC (refractory metal carbide) {Column 7, lines 15-65}.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to replace susceptor coating in Kordina et al' apparatus with a coating of refractory metal carbide as taught by Hölzlein et al in the apparatus of Kordina et al so that gas stream flowing in the chamber does not take up carbon atoms from inner wall surface of susceptor (Column 7, lines 35-45).

Regarding Claim 12: Kordina et al teach (Figure 5) that plates (liner) 16, 17 are made of silicon carbide interfacing with the processing chamber (Column 5, lines 50-60).

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***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh Dhingra



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